ATT9_SWF_WQOtherBen_1of1

ATTACHMENT 9. WATER QUALITY AND OTHER EXPECTED BENEFITS

Copeland Creek Enhancement and Restoration Project: Detention and Recharge Basins

Attachments to this Section

- Project Benefits and Avoided Costs Narrative
- Table 19

Copeland Creek Enhancement and Restoration Project: Detention and Recharge Basins
Sonoma County Water Agency

Project Benefits Worksheet					
Benefit Type	Benefit Amount	Unit of Measure	Economic Unit	Water Body	303d yes/no
Sediment Reduction	Flood storage and conveyance sufficient to protect the surrounding community from the damages associated with the one in one hundred year flood. See Avoided Costs for Benefit Amount.	See Avoided Costs	See Avoided Costs	Copeland Creek	Yes
Habitat Restoration, Invasive Plant Removal, and Improved Fish Passage	• 6,600 lineal feet of high quality riparian corridor with a diversity of canopy tiers to provide fish, invertebrate and wildlife habitat. • Improved water quality functions: for average and greater magnitude flows, as well as, sediment collection and storage; nutrient uptake and conversion and bacterial reduction • Flood storage and conveyance sufficient to protect the surrounding community from the damages associated with the one in one hundred year flood. • Riparian corridor bird habitat and bird watching for hikers who use the creekside trail. • Riparian corridor and floodplain improvements reduce impaired sediment and nutrient conditions downstream in the Laguna de Santa Rosa	1.25 Stream miles (6,600 linear feet) of riparian habitat; 10 acres of non-native invasive shrubs and trees restored by strategically removing exotics and replanting with 2,700 plants. Assumes value of one acre of restored habitat is $3,880	Water quality control value estimated at $6,700/hectare /year; improved recreation estimated at $3,000/hectare /year (PAY – IUCN, Gland, Switzerland)	Copeland Creek	Yes

Copeland Creek Enhancement and Restoration Project: Detention and Recharge Basins
Sonoma County Water Agency

Project Benefits Worksheet					
Benefit Type	Benefit Amount	Unit of Measure	Economic Unit	Water Body	303d yes/no
	• Improved passage and outmigration conditions for Threatened steelhead. $38,800				
Increased Water Supply/ Reliability	$45,000	75 acre-feet/year	$600 /acre-foot (wholesale water rate)	Copeland Creek	Yes
Environmental Benefit of base flow supply to the stream	$5,625	75 acre-feet/year	$75/acre-foot[1]	Copeland Creek	Yes
Flood Control and Increased Storm Water Detention	Present Value of Future Benefits: $13,677,400 Net Present Value: $4,289,059 Benefit Cost Ratio: 1.457 Annual Benefit: $867,753	100 year flood protection for Rohnert Park	Based on FRAM storm water model with property estimates from previous flood observations	Copeland Creek	Yes

1. The literature suggests that agricultural water use has a value of $53 per acre-foot, municipal water use has a value of $112 per acre-foot, and water left instream for environmental purposes, including salmonid habitat, has a value of $75 per acre-foot (Brown 2007)

Avoided Costs of Future Projects Worksheet				
Avoided Cost Type	**Avoided Cost Amount**	**Unit of Measure**	**Economic Unit**	**Avoided Cost Description**
Construction of conveyance capacity upgrades (e.g. culverts, storm drains, etc.)	$1 million	Difference between conveyance upgrades and detention basins	Engineer's estimate	Based on the cost of conveyance upgrades within the Copeland Creek Watershed, detention basins are the most cost effective method of providing 100 year flood protection for Rohnert Park's downstream urban area
Future sediment removal and vegetation management	$20,000/year	Reduction in current budgeted costs; focused sediment reduction at a rate of 2,000 cubic yards per year will reduce cost by approximately $5/cubic yard with much reduced environmental damage	Budget estimate; Reduced cost/cubic yard with focused approach	Decrease in operational costs associated with in-stream sediment removal and vegetation management based on historical costs

Project Benefit Narrative Table						
Benefit Type	Beneficiary	When Benefits will be Received	Estimates of Without-Project Conditions	Estimates of With-Project Conditions	Description of Methods Used to Estimate	Other: Adverse Effects, Uncertainty of the Benefits, Statewide Benefits
Flood Control (Hazard Reduction) and Increased Storm Water Detention	Rohnert Park & Sonoma County Water Agency	2015	Continued flooding of Rohnert Park properties and structures with accompanying risks to life and properties and impact on transportation corridors	Upon construction of detention basins will achieve flood control within 100 year storm limits	Preliminary engineering analysis of project alternatives (to contain 100-yr flows within channel) versus qualitative assessment of existing flooding conditions	
Increased Water Supply/Reliability and Environmental Benefit of base flow supply to the stream	Rohnert Park & Sonoma County Water Agency	2014	Continued reliance on imported water and reduced groundwater recharge potential	Increase aquifer recharge, decrease reliance on imported water, increase base flow to the stream with estimated benefits of $5,625 to $45,000 per year.	Cost/acre foot of water	Requires geotechnical and design studies to determine recharge capacity of soils
Sediment Reduction	Rohnert Park & Sonoma County Water Agency	2011-2014	Continued poor habitat conditions for native warm water and coldwater fisheries. Salmonid passage difficult at low and high flows. Detriment to habitat and fish passage. Continued non-native energy inputs (leaf drop, runoff, root-zone interactions) from stream side vegetation. Water quality improvements not realized that result from native plantings and strategic sediment removal. Increased flood	Decrease operational costs associated with continued in-stream sediment removal. Reduce downstream sediment in Laguna de Santa Rosa and lower Russian River and siltation impacts on waterways interconnected with Copeland Creek. Improved habitat conditions for warm and cold water fisheries. Healthier invertebrate populations resulting from native energy inputs. Improved water quality conditions resulting from development of a thalweg,	Based on last major sediment removal project in Copeland Creek.	

Project Benefit Narrative Table						
Benefit Type	Beneficiary	When Benefits will be Received	Estimates of Without-Project Conditions	Estimates of With-Project Conditions	Description of Methods Used to Estimate	Other: Adverse Effects, Uncertainty of the Benefits, Statewide Benefits
			potential.	closed canopy, and improved riparian buffer filtering (native vegetation filtering runoff before it enters the channel)		
Habitat Restoration with Invasive Plant Removal	Rohnert Park & Sonoma County Water Agency	20011-2014	Reduced habitat enhancement and restoration for riparian and aquatic species with continued poor out migration and passage conditions for salmonids.	Closing canopy will decrease operational costs associated with vegetation management. Establishing focused sediment collection areas will decrease cost associated with sediment removal. Improve fish habitat and wildlife habitat and passage by creating and enhancing riparian habitat	Based on outcomes of similar projects in other parts of county.	

Water Quality Benefits for Impaired Water Bodies and Sensitive Habitats Worksheet					
Benefit Type	Number of downstream water bodies affected	Water body names	Beneficial uses* for the water bodies affected by the Project	The change in the beneficial-use* activity for the affected portion of the water body	The total load reduction of pollutants in the affected water body
Sediment Reduction	**One**	**Laguna de Santa Rosa**	Reducing sediment in Copeland Creek will result in less sediment in the Laguna.	Full effect not realized until construction of detention basins.	Requires further study
Habitat Restoration with Invasive Plant Removal	**One**	**Laguna de Santa Rosa**	Improve water quality and moderate temperatures to improve migratory corridor for various species.	Reduce invasive plant species including ludwigia by decreasing downstream movement of plants.	Requires further study
Flood Control and Increased Storm Water Detention	**One**	**Laguna de Santa Rosa**	Attenuated peak flows from storm water detention in Copeland Creek.	Some incremental flood control until construction of detention basins.	Requires further study

Project Title: Copeland Creek Enhancement and Restoration Project: Detention and Recharge Basins - Sonoma County Water Agency and Team Partners

Table 19 – Water Quality and Other Expected Benefits (All costs should be in 2009 Dollars)									
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	j
	Type of Benefit	Mea-sure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) – (d)	Unit $ Value	Annual $ Value (f) x (g)	Discount Factor	Discounted Benefits (h) x (i)
2009					0		$0	1.000	$0
					0		$0	1.000	$0
					0		$0	1.000	$0
					0		$0	1.000	$0
2010					0		$0	0.943	$0
					0		$0	0.943	$0
2011	Avoided costs associated with reduction in sedmient	Unquantifiable			0		$0	0.89	$0
	Passive use values associated with increased spawning habitat and increased salmon populations	Unquantifiable			0		$0	0.89	$0
2012	Cultural value associated with increased spawning habitat and increased salmon populations	Unquantifiable			0		$0	0.84	$0
	Potential increased quality of drinking water	Unquantifiable			0		$0	0.84	$0
2013	Avoided cost of sediment deposition				0		$0	0.792	$0
					0		$0	0.792	$0
2014					0		$0	0.747	$0
					0		$0	0.747	$0
2015					0		$0	0.705	$0
					0		$0	0.705	$0
2016					0		$0	0.665	$0
					0		$0	0.665	$0
2017					0		$0	0.627	$0
					0		$0	0.627	$0
2018					0		$0	0.592	$0
					0		$0	0.592	$0
2019					0		$0	0.558	$0
					0		$0	0.558	$0
2020					0		$0	0.527	$0
					0		$0	0.527	$0
2021					0		$0	0.497	$0
					0		$0	0.497	$0
2022					0		$0	0.469	$0
					0		$0	0.469	$0
2023					0		$0	0.442	$0
					0		$0	0.442	$0
2024					0		$0	0.417	$0
					0		$0	0.417	$0
2025					0		$0	0.394	$0
					0		$0	0.394	$0
2026					0		$0	0.371	$0
					0		$0	0.371	$0

Table 19 – Water Quality and Other Expected Benefits									
(All costs should be in 2009 Dollars)									
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	j
	Type of Benefit	Mea-sure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) – (d)	Unit $ Value	Annual $ Value (f) x (g)	Discount Factor	Discounted Benefits (h) x (i)
2027					0		$0	0.35	$0
					0		$0	0.35	$0
2028					0		$0	0.331	$0
					0		$0	0.331	$0
2029					0		$0	0.312	$0
					0		$0	0.312	$0
2030					0		$0	0.294	$0
					0		$0	0.294	$0
2031					0		$0	0.278	$0
					0		$0	0.278	$0
2032					0		$0	0.262	$0
					0		$0	0.262	$0
2033					0		$0	0.247	$0
					0		$0	0.247	$0
2034					0		$0	0.233	$0
					0		$0	0.233	$0
2035					0		$0	0.22	$0
					0		$0	0.22	$0
2036					0		$0	0.207	$0
					0		$0	0.207	$0
2037					0		$0	0.196	$0
					0		$0	0.196	$0
2038					0		$0	0.185	$0
					0		$0	0.185	$0
2039					0		$0	0.174	$0
					0		$0	0.174	$0
2040					0		$0	0.164	$0
					0		$0	0.164	$0
2041					0		$0	0.155	$0
					0		$0	0.155	$0
2042					0		$0	0.146	$0
					0		$0	0.146	$0
2043					0		$0	0.138	$0
					0		$0	0.138	$0
2044					0		$0	0.13	$0
					0		$0	0.13	$0
2045					0		$0	0.123	$0
					0		$0	0.123	$0
2046					0		$0	0.116	$0
					0		$0	0.116	$0
2047					0		$0	0.109	$0
					0		$0	0.109	$0
2048					0		$0	0.103	$0
					0		$0	0.103	$0
2049					0		$0	0.097	$0
					0		$0	0.097	$0
2050					0		$0	0.092	$0
					0		$0	0.092	$0
2051					0		$0	0.087	$0
					0		$0	0.087	$0
2052					0		$0	0.082	$0
					0		$0	0.082	$0
2053					0		$0	0.077	$0

Table 19 – Water Quality and Other Expected Benefits									
(All costs should be in 2009 Dollars)									
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	j
	Type of Benefit	Mea-sure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) – (d)	Unit $ Value	Annual $ Value (f) x (g)	Discount Factor	Discounted Benefits (h) x (i)
					0		$0	0.077	$0
2054					0		$0	0.073	$0
					0		$0	0.073	$0
2055					0		$0	0.069	$0
					0		$0	0.069	$0
2056					0		$0	0.065	$0
					0		$0	0.065	$0
2057					0		$0	0.061	$0
					0		$0	0.061	$0
2058					0		$0	0.058	$0
					0		$0	0.058	$0
2059					0		$0	0.054	$0
					0		$0	0.054	$0
2060					0		$0	0.051	$0
					0		$0	0.051	$0
2061					0		$0	0.048	$0
					0		$0	0.048	$0
2062					0		$0	0.046	$0
					0		$0	0.046	$0
2063					0		$0	0.043	$0
					0		$0	0.043	$0
2064					0		$0	0.041	$0
					0		$0	0.041	$0
Project Life									
Total Present Value of Discounted Costs (Sum of Column (i))									$0
Comment Box									